



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Re the Application of: **Shoji HARA, et al.**

Group Art Unit: 1762

Serial No.: 09/782,169

Examiner: **TALBOT Brian K.**

Filed: **February 14, 2001**

Confirmation No.: 2107

For: **LAMINATE COMPRISING POLYIMIDE AND CONDUCTOR LAYER, MULTI-LAYER WIRING BOARD WITH THE USE OF THE SAME AND PROCESS FOR PRODUCING THE SAME**

REQUEST FOR RECONSIDERATION AFTER FINAL REJECTION

Mail Stop AF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Date: January 9, 2004

Sir:

In response to the Office Action dated **September 9, 2003**, applicants request favorable reconsideration of the above-identified application. Claims 1-13, 17 and 18 are pending.

Examiner Talbot is thanked for the courtesies extended to the undersigned attorney during the personal interview conducted on January 8, 2004. Applicant's separate record of the substance of that interview is incorporated into the following discussion.

Claims 1-13, 17 and 18 were rejected under 35 USC §103(a) as being unpatentable over Chen et al. or Shiotani et al. in combination with Ameen et al. Favorable reconsideration of this rejection is earnestly solicited.

The Examiner acknowledges that the primary references to Chen et al. and Shiotani et al. fail to teach a dry plating method and subsequent wet plating method to build up the conductor. However, the primary references also fail to teach directly forming the at least one conductor layer

on the at least one thermoplastic polyimide surface. Furthermore, the cited references do not provide the step of heating after the at least one conductor layer has been directly formed on the at least one surface of thermoplastic polyimide.

Ameen et al. is applied by the Examiner for its disclosure of forming a metal flash layer on a polymer substrate. Ameen et al. does not teach a thermoplastic polyimide, as acknowledged by the Examiner in item 6 on page 4 of the Office Action. The Examiner dismisses this deficiency by arguing that Ameen et al. is only relied upon for a teaching of applying a metal flash layer atop a polymer layer.

Chen et al. and Shiotan et al. both apply heat in order to adhere a metal foil to the thermoplastic resin. On the other hand, in Ameen et al. carries out simple sputtering on a non-thermoplastic film, thus achieving a low adhesion strength (Namely, this technique corresponds to one of the conventional techniques indicated in the present application), and therefore there is no positive reason of applying such obsolete technique in Ameen et al.

In the case of forming the laminate of an insulating layer and a metal layer, the following should be considered:

1. In the case of using a metal foil

The two layers cannot be laminated without adhesive component. For that reason, as set forth in the cited references, a thermoplastic polyimide resin is used as the adhesive component for heated pressure bonding. Heat is applied in order to bond the metal foil (i.e., to form a metal layer) to the insulating layer, and a degree of heating sufficient for fusion bonding is essential.

2. In the case of directly providing a metal layer by sputtering, etc.

It is impossible to laminate a blank (solid) metal foil in cases where no adhesive component exists. Thus, it has been proposed to form a metal layer by metal deposition via sputtering, etc., whereby no intentional heating is necessary for the metal layer formation. A metal layer can be formed without intentional heating; in some cases, even cooling is conducted (see Ameen et al.)

The material indicated in Ameen et al. is a non-thermoplastic polyimide film. Not only the type of resin of the present invention is different, but also the method of forming a metal layer is different between them. Moreover, since the method of forming a metal layer as described in Ameen et al. requires no heat application, there exists no reason to combine the references.

There must be a basis in the art for combining or modifying references. The mere fact that the references can be combined or modified does not render the resulting combination obvious unless the prior art also suggests the desirability of the combination. In determining whether one of ordinary skill in the art would find it obvious to modify or combine references, the teachings of the references taken with the knowledge that a worker in the art already possess constitute the scope and content of the prior art. Thus, the question is whether the prior art taken as a whole would suggest the claimed invention.

As noted in the present specification, polyimide films show only poor adhesion strength to conductor layers formed thereon. See page 2 of the specification. The primary references to Chen et al or Shiotani et al. apparently recognize the poor adhesion, and therefore provide specific methods which laminate a metal foil or sheet to a polyimide material. One of ordinary

skill in the art thus would not have been motivated by the teachings of Ameen et al. to directly form a metal layer on a polyimide substrate. The Examiner can not simply dismiss the teaching of Ameen et al. as being relied upon only for a teaching of applying a metal flash layer atop a polyimide layer, but must consider the knowledge which is possessed by one of ordinary skill in the art of poor adhesion of a metal layer to polyimide. As such, one of ordinary skill in the art who is aware of the problems associated with the poor adhesion of metal to polyimide would not merely look to the teachings of Ameen et al. which is not specific to polyimide.

Even if one of ordinary skill in the art would have combined the teachings of Chen et al. or Shiotani et al. with Ameen et al., the resulting combination would not teach or suggest heating after the metal layer is directly formed on the polyimide surface.

Claims 1-11, 13, 17 and 18 were rejected under 35 USC §102(b) as being clearly anticipated by JP62-60640. The rejection is respectfully traversed. JP '640 does not teach heating after a metal layer is formed on a thermoplastic polyimide sheet. A full translation of JP '640 is submitted herewith which confirms that the reference does not teach sputtering or vapor depositing a metal on thermoplastic polyimide followed by heating.

Claim 12 was rejection under 35 USC §103(a) as being unpatentable over JP '640 in combination with Ameen et al. It is believed that this rejection is overcome upon the Examiner's review of the full translation of JP '640.

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The present invention also exhibits results which would have been unexpected from the cited references. Such results were presented in the declaration under 37 CFR §1.132 presented with the prior response. Tables 1 and 2 on pages 6 and 7 of that declaration clearly exhibit unexpected results associated with the claimed heating after the conductor layer is directly formed on at least one of the thermoplastic polyimide surfaces.

For at least the foregoing reasons, the claimed invention distinguishes over the cited art and defines patentable subject matter. Favorable reconsideration is earnestly solicited.

Should the Examiner deem that any further action by applicant would be desirable to place the application in condition for allowance, the Examiner is encouraged to telephone applicant's undersigned attorney.

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In the event that this paper is not timely filed, Applicant respectfully petitions for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 50-2866.

Respectfully submitted,

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SGA/arf

Attachments: Petition for Extension of Time
Full English Translation of JP '640

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